

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of work-piece processing a work piece by pulsed electric discharges in solid metal-gas plasmas comprising the steps of:
providing a vacuum in a processing chamber,
providing sputtering and reactive gases in the processing chamber,
producing pulsed discharges with a duty cycle of 1*10⁻⁷% to 10% in gas and vapor located between first electrodes including an anode and a magnetron sputtering cathode for creating plasma blobs of ionized the gas and partially ionized solid metal plasma, the plasma blobs moving or spreading from a region at a surface of the magnetron sputtering cathode towards second electrodes including the work piece and the anode, and
applying a potential to the work piece,
characterized in
that the potential is applied to the work piece in such a way that a pulsed current comprising biasing pulses arises between the second electrodes, and that the biasing pulses are produced by both the pulsed discharges and the work piece potential, the biasing pulses of the pulsed current between the second electrodes having or appearing with the same frequency as the pulsed discharges.

2. (Currently Amended) The A-method according to claim 1, characterized in that the potential is applied to the work piece so that biasing discharges are produced between the anode and the work piece when said plasma blobs have spread to regions at the anode and at the work piece, the pulsed current comprising the biasing pulses being the current of the biasing discharges.

3. (Currently Amended) The A-method according to claim 1, characterized in that the potential is applied to the work piece in such a way that the biasing pulses coincide in time with pulses to create the pulsed discharges between the first electrodes.

4. (Currently Amended) The A-method according to claim 1, characterized in that the potential is applied to the work piece in such a way that the biasing pulses exist as long as a plasma exists.

5. (Currently Amended) The A-method according to claim 1, characterized in that the potential is applied to the work piece in such a way that the biasing pulses start simultaneously with the pulsed discharges between the first electrodes in which plasmas are created and are terminated after the end of the decay of the plasmas created.

6. – 17. (Cancelled)

18. (Withdrawn) An installation for work piece processing by pulsed electric discharges in solid-gas plasmas comprising: a process chamber, a work piece placed in the process chamber, a system for maintaining a vacuum in the process chamber, a system for providing sputtering and reactive gases to the process chamber, first electrodes including an anode and a magnetron sputtering cathode placed in or integrated in the process chamber, second electrodes including the anode and the work piece, a plasma pulser circuit including the first electrodes for creating gas and partially ionized solid plasma blobs by pulsed discharges in the gases and vapor in the processing chamber in the region between the first electrodes, the plasma blobs moving or spreading from a region at a surface of the magnetron sputtering cathode towards the work piece and the anode, a biasing pulser circuit including the work piece for applying an electric potential to the work piece, characterized in that the plasma pulser circuit and the biasing pulser circuit are powered by the same pulser.

19. (Withdrawn) An installation according to claim 18, characterized by a work piece switch connected in a line between the work piece and the cathode.

20. (Withdrawn) An installation according to claim 19, characterized by an impedance device or a resistor, in particular an impedance device having a variable impedance or a resistor having a variable resistance, connected in the line.

21. (Withdrawn) An installation according to claim 20, characterized in that the impedance device or resistor has an impedance or a resistance of the range of 0-10 kOhm.

22. (Withdrawn) An installation according to claim 18, characterized by a work piece switch connected in a line between the work piece and the magnetron sputtering cathode, a control and monitoring unit connected to the work piece switch for commanding it, the control and monitoring unit commanding the work piece switch to short-connect the work piece through said line to the magnetron sputtering cathode for a period of 0.1-10 .mu.s after each magnetron discharge breakdown.

23. (Withdrawn) An installation according to claim 18, characterized by a cathode switch, an anode switch connected in a line between the work piece and the anode, a control and monitoring unit connected to the switches and commanding them so that the work piece is disconnected from the magnetron sputtering cathode by the cathode switch before the magnetron breakdown in creating a discharge between the anode and the magnetron sputtering cathode and thereafter is connected by the second work piece switch to the anode for a period of 0.1-100 .mu.s after magnetron discharge break down.

24. (Withdrawn) An installation according to claim 18, characterized by an anode switch connected in a line between the work piece and the anode, a resistor, in particular a resistor having a variable resistance, connected in the line, a control and monitoring unit connected to the anode switch for commanding it to connect the work piece to said potential, the control and monitoring unit periodically connecting the work piece to the anode through the resistor to make the work piece adopt the potential of the anode.

25. (Withdrawn) An installation according to claim 24, characterized in that the resistor has a resistance of the range of 0-10 kOhm.

26. (Withdrawn) An installation according to claim 18, characterized in that the anode includes walls of the process chamber and is the same for plasma discharges and biasing pulses.

27. (Withdrawn) An installation according to claim 18, characterized in that the anode is an electrode placed inside the process chamber, electrically insulated therefrom and is the same for plasma discharges and biasing pulses.

28. (Withdrawn) An installation according to claim 19, characterized in that the anode includes two separate anode parts located the inside process chamber, electrically insulated therefrom it and are different for plasma discharges and biasing pulses.

29. (Withdrawn) An installation according to claim 18, characterized in that the plasma generating discharges and work piece processing discharges are produced by same electric pulser.

30. (Withdrawn) An installation according to claim 18, characterized in that the plasma generating discharges and work piece processing discharges are produced by different electric pulsers.

31. (Withdrawn) An installation according to claim 18, characterized by a variable resistor connected in a line between the work piece and a terminal of an energy supply to be selectively bypassed by a bypass line.

32. (Withdrawn) An installation according to claim 18, characterized by a pulser or pulsed generator including a charged capacitor.

33. (Withdrawn) An installation according to claim 18, characterized in that the processing/biasing pulses are synchronized with the plasma generating pulses.

34. (Withdrawn) An installation according to claim 18, characterized in that the connecting and disconnecting of the work piece from electrodes is performed by solid-state switches.

35. (New) The method according to claim 1, where said pulsed discharges are provided by a first high current pulse supply and said biasing pulses are provided by a second high current pulse supply.

36. (New) The method according to claim 1, where the magnetron sputtering cathode and the work piece are connected to the negative pole of different high current pulse supplies.

37. (New) The method according to claim 1, where said frequency of said biasing pulses and said pulsed current is 20 Hz – 20 kHz.

38. (New) The method according to claim 1, characterized in that said biasing pulses are supplied by a biasing power supply including a DC power supply.

39. (New) The method according to claim 1, characterized in that said biasing pulses are supplied by a biasing power supply including a DC power supply for charging a capacitor, said biasing pulses being produced from the charge of said capacitor.

40. (New) The method according to claim 1, characterized in that the magnitude of a biasing current of said biasing pulses is at least 10% of the magnitude of a magnetron discharge current of said pulsed discharges.

41. (New) The method according to claim 1, characterized in that said biasing pulses and said pulsed discharges are synchronized.

42. (New) The method according to claim 1, characterized in that said pulsed discharges are produced by a pulse generator including a capacitor acting as accumulator for an electric charge, where energy stored in said capacitor is used to produce said discharges.

43. (New) A method of processing a work piece by pulsed electric discharges in metal-gas plasmas comprising the steps of:

providing a vacuum in a processing chamber,

providing sputtering and reactive gases in the processing chamber,

producing pulsed discharges in gas and vapor between first electrodes including an anode and a magnetron sputtering cathode for creating a plasma

where said pulsed discharges have a duty cycle of $1 \times 10^{-7}\% - 10\%$,

applying a potential to the work piece in such a way that a pulsed current comprising biasing pulses arises between second electrodes including the work piece and the anode, the biasing pulses of the pulsed current between the second electrodes having or appearing with the same frequency as the pulsed discharges.

44. (New) The method according to claim 43, where said pulsed discharges are provided by a first high current pulse supply and said biasing pulses are provided by a second high current pulse supply.

45. (New) The method according to claim 43, where the magnetron sputtering cathode and the work piece are connected to the negative pole of different high current pulse supplies.

46. (New) The method according to claim 43, where said frequency of said biasing pulses and said pulsed current is 20 Hz – 20 kHz.

47. (New) The method according to claim 43, characterized in that said biasing pulses are supplied by a biasing power supply including a DC power supply for charging a capacitor, said biasing pulses being produced from the charge of said capacitor.

48. (New) The method according to claim 43, characterized in that said biasing pulses are supplied by a biasing power supply including a DC power.

49. (New) The method according to claim 43, characterized in that the magnitude of a biasing current of said biasing pulses is at least 10% of the magnitude of a magnetron discharge current of said pulsed discharges.

50. (New) The method according to claim 43, characterized in that said biasing pulses and said pulsed discharges are synchronized.

51. (New) The method according to claim 43, characterized in that said pulsed discharges are produced by a pulse generator including a capacitor acting as accumulator for an electric charge, where energy stored in said capacitor is used to produce said discharges.